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NAVIGATING THE COVID-19 STORM: A QUALITATIVE EXPLORATION OF NIGERIAN HEALTHCARE WORKERS' CHALLENGES.

Omoregbe Isaac Newton[1,2,3] and Ekaete Tobin[2,3]

Affiliations: [1] Edo University Iyamoh, Edo state, Nigeria
[2]Irrua Specialist Teaching Hospital, Irrua Edo State, Nigeria
[3]Ambrose Alli University, Ekpoma, Edo State, Nigeria

Correspondence to: Omoregbe Isaac Newton
Email: omoregbeisaac@gmail.com

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ABSTRACT

Background: The pandemic of the coronavirus disease 2019 (COVID-19) has caused increasing challenges for healthcare workers globally. However, there is a dearth of information about these challenges in many developing countries, including Nigeria. This study explores the challenges faced by healthcare workers (doctors, nurses, and Laboratory scientists) based on their experience during COVID-19 management in Nigeria.

Methods: We conducted qualitative research among healthcare workers of two tertiary healthcare centres in Irrua and Benin City of Edo State Nigeria from 1st July 2024 to 30th December 2024. Focused group discussions (FGD) were employed with 36 healthcare workers (Physicians, Nurses, and Medical Laboratory Scientists) using a grounded theory design and a quota sampling technique was used to select the healthcare workers. The FGD guide was used to conduct FGDs among healthcare workers (doctors, nurses, and medical laboratory scientists) to allow for free expression of self and better representativeness. Data were collected, audiotaped, and transcribed. The data analysis process involved systematic organization, coding, and interpretation of textual or visual data to identify patterns, themes, and insights.

Results
Seven themes emerged from the study. Healthcare workers experienced the following challenges: fear of nosocomial infection, stigmatization, insufficient staffing, inadequate personal protective equipment (PPE), training gaps, and inconsistent laboratory reagent supplies. Meanwhile, some barriers require support from the government, public and hospital managers. Overcoming these

challenges requires concerted efforts from governmental bodies, the public, and hospital management.

Conclusion

The findings reveal the widespread difficulties encountered by healthcare workers throughout the pandemic, underscoring the urgent necessity of providing them with essential safety gear, well-defined protocols for infection, prevention, and control, and robust support systems to address their physical and mental needs.

Keywords: Challenges, COVID-19, Healthcare workers, Pandemic

INTRODUCTION

The COVID-19 pandemic has tested healthcare systems worldwide, with healthcare workers (HCWs) facing unparalleled challenges as they manage and mitigate the spread of the virus (Filip *et al.,* 2022; Nguyen, 2020). Since the emergence of SARS-CoV-2 in late 2019, HCWs have shouldered the burden of delivering care to patients under extreme conditions, often at great personal risk (Nguyen, 2020). The pandemic's rapid escalation, coupled with the virus's contagious nature and the lack of a definitive cure, has amplified fears and anxieties, particularly as HCWs observed colleagues falling ill or succumbing to the disease (Roberts, 2020). Key challenges have included managing asymptomatic carriers, triaging suspected COVID-19 cases, and addressing resource limitations, such as shortages of personal protective equipment (PPE), isolation wards, and critical care resources. These issues have strained healthcare systems and place HCWs in situations where they must deliver optimal care despite limited resources and unclear clinical pathways (Filip *et al.,* 2022). The World Health Organization (WHO) identifies the health workforce as a core pillar of health systems, emphasizing that HCWs are disproportionately affected by outbreaks and other external shocks.

In addition to physical risks, HCWs have endured significant psychological distress. The combination of overwhelming workloads, prolonged exposure to high-risk environments, and fear of transmitting the virus to loved ones has led to insomnia, anxiety, depression, and burnout (Ripoll *et al.,* 2024; Sasidharan & Dhillon, 2021). The need to maintain physical distance from families as a precautionary measure has further exacerbated feelings of isolation(Cudjoe & Kotwal, 2020). These challenges are even more severe in low-resource settings due to systemic inequities and under-resourced healthcare infrastructures(Fatani *et al.,* 2024; Spencer *et al.,* 2023).

The broader implications of these challenges have been profound. They have affected healthcare delivery, reduced the quality of patient care, and exposed gaps in preparedness and resilience within healthcare systems globally. Social distancing measures, while effectively controlling the virus's spread, are particularly difficult for HCWs, whose roles necessitate close patient interaction, thereby heightening their risk of infection(Fatani *et al.,* 2024).

Addressing the challenges HCWs face is critical for strengthening healthcare systems during the ongoing pandemic and future public health emergencies. Insights into these challenges can guide the development of targeted interventions, including improved access to PPE, mental health support, and workforce-strengthening initiatives. Policymakers must consider these factors to ensure the resilience of HCWs and the sustainability of healthcare delivery in crises.

METHODS

Study Area

The study was carried out at the University of Benin Teaching Hospital (UBTH), and Irrua Specialist Teaching Hospital (ISTH) both in Edo State, South-South geopolitical zone, Nigeria. UBTH is a **910**-bed tertiary healthcare facility with about 3870 personnel (Obaseki DE, Osaigbovo II, Ogboghodo EO, 2021) why ISTH has 550 beds with ongoing expansion and 1596 personnel (Irrua Specialist Teaching Hospital Irrua., 2012; Okogbenin, 2022). They provide referral, emergency, and primary care services for Edo and the neighbouring states. The hospitals have administrative staff, technical staff, labourers, and HCWs. The HCWs comprise staff that offer clinical care, laboratory services, and radiological services. Services are rendered either on an outpatient or inpatient basis. The ISTH encompasses a total of 14 wards, including divisions such as male medical, female medical, male surgical, female surgical, orthopaedic, psychiatric, paediatrics, special care baby unit, intensive care, Lassa, gynaecological, antenatal, postnatal, and labour wards. Additionally, it has a children's emergency unit, accident and emergency unit, as well as multiple theatres (Irrua Specialist Teaching Hospital Irrua., 2012). Furthermore, the UBTH has 30 wards, supplementing those previously mentioned with specialities like neurological, paediatric surgical, haemato-oncological, and otolaryngology wards, among others. In 2020, ISTH admitted its first COVID-19 case in Edo State and has since become a central hub for managing COVID-19 cases and other viral hemorrhagic diseases. The isolation ward at ISTH originally had 42 bed spaces, but during the peak of the outbreak, it became overburdened. Consequently, an

additional 20-bed isolation ward was set up in an alternative facility to accommodate the growing number of confirmed cases, a measure that remained in place for six months.

Study design: This study utilized an exploratory qualitative grounded theory design to investigate the challenges faced by healthcare workers during the management of COVID-19 patients

Study population

The target populations were Healthcare workers who were directly involved in the care and management of COVID-19 patients for at least 12 months.

Study duration

This study was carried out over 6 months, from 1st July 2024 to 30th December 2024.

Sample Size Determination

Six focus group discussions, each involving six healthcare workers, were conducted across the two healthcare facilities. This number of participants was anticipated to ensure data saturation.

Sampling technique

A quota sampling technique was used to select a homogenous group into three quotas (Doctors, Nurses, and Laboratory scientists) for the FGD. From each of the quotas, Six HCWs were selected on purpose based on their experience in the management of COVID-19. This sampling technique was carried out in both facilities (UBTH and ISTH).

Study Instruments

The focus group discussion (FGD) guide consists of two main sections: a section to obtain demographic information of the respondents including years of experience and specific roles in COVID-19 patient care, while the other section is designed to assess challenges faced by healthcare workers. The FGD guide was used to conduct FGDs among healthcare workers (doctors, nurses, and medical laboratory scientists) to allow for free expression of self and better representativeness. These FGDs were used to explore data and information on the challenges faced by healthcare workers in managing COVID-19 patients.

Data Collection

Six FGDs were conducted in UBTH and ISTH, Department of Community Medicine, at a time and venue scheduled by the HCWs who sat comfortably in a semi-circle facing the moderator. The FGD guide was used to guide the discussion, and the discussion was directed by the researcher.

Each interview lasted forty-five minutes to one hour and each session included notetaking and audio recording and finally transcribed and coded within 24-48 hours.

Measurement of Variables

The measurement of variables in this study involved a comprehensive exploration of factors and themes related to the challenges encountered by healthcare workers. This process entailed deriving meaningful insights from non-numerical data through the identification of patterns, themes, and categories. Various variables were considered, including healthcare worker characteristics such as age, gender, professional background, and years of experience. The study assessed the nature of challenges faced by health workers, evaluating both their impact and severity on healthcare practices. Additionally, the investigation involved the responses and coping mechanisms adopted by healthcare workers, including any support systems or resources utilized to navigate these challenges. Emotional stressors were examined, with a focus on understanding how health workers coped with such stress. Other variables of interest encompassed an exploration of communication constraints and the availability of resources like personal protective equipment (PPE) and infrared thermometers, among others within the healthcare system. Collaboration and teamwork dynamics were also scrutinized to understand their impact and the challenges encountered when working with colleagues in the management of COVID-19.

Data analysis

Descriptive analyses of sociodemographic data were conducted to calculate frequencies and mean using STATA version 16. Qualitative data from audio-recorded interviews were analyzed using Colaizzi's phenomenological method, which allows participants to clarify data and refine findings. In the first step, audio-recorded interviews were transcribed verbatim into written form. The transcripts were read four times to gain an in-depth understanding of the participants' experiences, thoughts, and emotions. In the second step, each transcript was analyzed to extract significant statements relevant to the research objectives. These statements were written separately for each participant and labelled with the transcript page and line numbers. In the third step, general meanings were formulated from the significant statements. These meanings were discussed with peer group members to ensure accuracy and consistency. The codes and general meanings were then reviewed by an expert to validate the process. In the fourth step, interpretive meanings were synthesized and organized into overarching themes and subthemes, providing a structured

understanding of the data. In the fifth step, the themes were integrated into a comprehensive description of the challenges faced by healthcare workers in managing COVID-19 patients. The description was reviewed and discussed with experts to ensure it accurately reflected the phenomenon under investigation. In the final step, the results and interpretations were validated with the participants. The findings and transcripts were shared via email, followed by phone consultations to gather their feedback. All participants expressed satisfaction and agreement with the findings and conclusions.

RESULTS

Socio-Demographic Characteristics of the focus group discussions

Thirty-six respondents were included in six focus group discussions (FGD). The median age of the Healthcare workers in the FGD was 46 (41-50) years with almost all the patients married (97.2%). They included equal proportions of healthcare workers; 12 (Doctors (33.3%), 12 (Nurses (33.3%), and Laboratory Scientist 12 (33.3%) with a median length of service was 7 years (IQR: 4-13).

Table 1: Sociodemographic Characteristics of Patients (FGD)

Characteristics	**Frequency n=352 (%)**
Age Median (IQR) years	46 (41-50)
Sex	
Female	20 (55.6)
Male	16 (44.4)
Marital Status	
Married	35 (97.2)
Single	1 (2.8)
Occupation	
Doctor	12 (33.3)
Nurses	12 (33.3)
Medical laboratory scientist	12 (33.3)
Median Years of Service (IQR)	7 (4-13)

IQR: Interquartile range

Qualitative data on the Challenges Healthcare Workers faced during the Management of COVID-19.

Seven themes emerged from the FGDs, i.e., Staff strength, workload, training, laboratory reagent, intensive care unit, treatment, PPE, nosocomial infection, social acceptance (stigmatization), mental health, incentives (remuneration), and data management.

Nosocomial Infection

The risk of nosocomial infections was a constant worry among all healthcare workers, given the highly contagious nature of COVID-19 infection. Most of the healthcare workers were worried that they would contract the disease while at work. This is shown in the quotes below

"I spent the first month working in fear after we made the first diagnosis of COVID-19 in the laboratory. Unfortunately, I contracted the COVID-19 virus and was asked to go for home care for 2 weeks. (Lab scientist). "We were always worried about catching the virus from patients or spreading it to others. It was a constant source of anxiety." [Nurse]

Contrary to what the previous patients said, most of the staff that had COVID-19 did not work with the isolation centre.

For example, most of the patients said, "Most staff who contracted COVID-19 were those working outside the isolation centre" One participant said, "We cannot explain why God spared our lives." "We were always worried about catching the virus from patients or spreading it to others. It was a constant source of anxiety." (Nurses)

Furthermore, most of the health workers also reported that they contracted Covid 19 while working thus limiting the number of health workforce. This is as shown in the quotes below:

"I went for national deployment to manage COVID-19 for several months. When I came back, I had COVID-19 and went into isolation for two weeks." [Doctor]

"Some of the staff got covid 19 and were admitted in the isolation centre and this further strained the limited workforce' [*Lab scientist*]

"I got infected with COVID-19 twice with positive PCR tests, so I had to experience what others did. It was not a good experience. Unfortunately, there was no insurance, so I bought all my drugs out of pocket" [Doctor]

Stigmatization

Most of the healthcare workers reported that they faced stigmatization from various sources. Colleagues often treated them with suspicion or avoidance due to fear of infection. The public,

similarly, reacted with prejudice and sometimes hostility. Even family members, driven by concern for their safety, occasionally distanced themselves.

For example, a laboratory scientist said "I was given accommodation in staff quarters, and my neighbours asked me to leave for fear of infecting them with COVID-19. For six months, I faced constant stigmatization and couldn't visit my family for fear of infecting them.".

Another laboratory scientist said "Some people stopped coming close to me because I worked in the laboratory. Some even refused to let me into their offices.

"Some people were afraid of me; you could see them refusing to shake hands with me." (laboratory scientist)

"When we took our reports to management, the admin staff would shout at us to keep a distance. Senior nurses would shout from a distance, asking who was there. Other nurses and staff didn't come near us, and we didn't go to them." (Nurses)

"Some colleagues had COVID-19 symptoms but refused to go for PCR testing and instead bought drugs to treat themselves for fear of stigmatization." [Doctor]

"When colleagues knew you were working in isolation centers treating COVID-19 patients, they tried to distance themselves from you." [Doctor]

Staff Strength and High Workload

Healthcare workers interviewed indicated that hospitals faced a critical shortage of medical personnel, exacerbated by the "Japa syndrome," where many healthcare workers are leaving the country for better opportunities. This has led to a significantly higher workload for the remaining medical workforce in the healthcare facilities. At the two treatment facilities studied, doctors and other healthcare workers were already overworked, and the COVID-19 pandemic further strained the limited workforce. Doctors, nurses, and medical laboratory scientists worked around the clock to manage the overwhelming load of COVID-19 patients. For example:

"Majority of the doctors said that Doctors have left the country in drones, a phenomenon one of them referred to as Japa syndrome, leading to more work for those left behind."

Furthermore, a few patients reported that some of their health workers were deployed for national assignments to other parts of the country thus reducing the number of health workers managing the covid 19 patients in the studied facilities. This is corroborated by the quotes below:

"We were responsible for sampling, testing, and data management. Before we finished running the received samples, new ones would arrive. We had to work round the clock. On one occasion, my head of department took me home at about 11:30 pm." (Laboratory scientist)

Some of us were sent on national assignments to Abuja to help manage COVID-19 patients, further putting more stress on the few remaining doctors. [Doctor]

Additionally, the fear of contracting covid 19 infections made some workers to refuse work in the isolation wards further increasing the workload. This is shown in the quotes below.

"I was trained on COVID-19 sample collection along with four other staff members from various departments. Unfortunately, everyone except me refused to collect samples from COVID-19 patients for fear of being infected. For six months, I went around different departments to collect samples when needed and then returned to the laboratory to continue collecting samples from referred patients." (Doctor)

About half of the patients also reported that ISTH was the first NCDC accredited COVID-19 laboratory in Edo state, and so the volume of samples sent for COVID-19 testing was overwhelming. A laboratory scientist reported thus:

"We received samples from every facility in the state, including neighbouring states, worked late into the night, and had our off-duty periods cancelled. Those on leave were called back to work." (Laboratory scientist)

Due to the lack of personnel, we worked morning and evening shifts instead of the usual three shifts (Nurse)

Personal Protective Equipment (PPE)

Healthcare workers encountered significant challenges with Personal Protective Equipment (PPE) during COVID-19. Many of the healthcare workers interviewed complained of widespread shortage of PPE during the pandemic, making it difficult to ensure adequate protection for all staff. This was alluded to by the quotes below:

"The availability and quality of PPE were inconsistent. At the beginning, PPE was in such short supply that we had to reuse face masks. So, we started managing face masks. It was frightening knowing we were at risk of getting infected." [Doctor]

"There were times management said one face mask per day. We had to start using theatre gowns in place of PPE (coverall)." (Doctor)

However, a few patients reported that PPE was readily available despite increased workload as seen in the quote below.

"PPE was readily supplied by management. We did not lack PPE." [Nurse]

The discomfort and extended use of PPE were said to have led to physical strain and fatigue.

"It was uncomfortable using PPE for most of our shifts. We would sweat, our clothes would get soaked, and we were worn out daily." (Nurse)

"We couldn't breathe with the N-95, and it was suffocating using the PPE. We frequently got soaked in the PPE, which made us dizzy." (Nurse)

Training and Treatment Guideline

Lack of training posed a significant challenge in the management of COVID-19. Many healthcare workers felt unprepared due to inadequate and inconsistent training on COVID-19 protocols and treatment methods. Many patients had to learn on the job. However, an infectious disease specialist reported that he had been trained severally on infectious diseases so managing covid 19 patients was not difficult.

"We were learning on the job. There wasn't enough training on how to handle COVID-19 samples safely, which put us at risk." (Laboratory scientist)

"I learned how to collect oral and nasopharyngeal samples after the first COVID-19 case was diagnosed in our lab." (Laboratory scientist)

"I am an infectious disease specialist with several trainings. We usually manage other viral haemorrhagic diseases such as Lassa fever and Monkeypox, so COVID-19 was not much of a difference." [Doctor]

The laboratory scientists working at ISTH agreed that they were trained on how to conduct polymerase chain reaction tests since that is the investigation used in diagnosing Lassa fever, another viral disease. This is shown in the quote below

"We learned how to carry out polymerase chain reaction tests before the COVID-19 outbreak because we were already using it for diagnosing Lassa fever." (Laboratory scientist)

Many patients reported having had prior training in infection prevention and control (IPC) although a few were not trained on donning and doffing of full PPE as shown below

"Training on IPC was not a problem, as most of us were regularly trained on it." (Nurse)

"Most of us had training in hand hygiene practices with certificate". (Nurse)

"I was confused about how to wear personal protective equipment (PPE) except for the face mask and gloves. I could barely know how to wear the full PPE."(Doctor)

"There was no universally acceptable drug treatment for COVID-19, as we have to do our own research and manage symptomatically." (Doctor)

"Intensive care units (ICU) refused admission of COVID-19 patients due to fear of infecting the patients in the unit and this further complicated the management of critically ill patients." (Doctor).

Dialysis was also refused for COVID-19 patients for fear of contaminating the dialysis machine and infecting other patients that might require dialysis" (Doctor).

Laboratory Reagents

The unavailability of laboratory reagents posed a significant challenge in the management of COVID-19. Frequent stockouts and inconsistent supplies of reagents hampered the timely diagnosis and treatment of patients.

"We used to run out of stock, as we were regularly supplied with reagents close to their expiration date." (Laboratory scientist)

"There were times we ran out of reagents and had to wait a long time for supplies. This led to piled-up samples, increased turnaround time for results, and delayed diagnosis and treatment of COVID-19 patients." (Laboratory scientist)

Healthcare workers often had to cope with reagents that were either near their expiration date or not properly validated, slowing down testing processes. The constant need to adapt to different brands of reagents disrupted workflow and reduced efficiency in laboratories. These reagent shortages and inconsistencies contributed to delays in test results, complicating the overall response to the pandemic.

"When you are trying to familiarize yourself with a particular reagent, a different type will just be supplied, which slows down work," (Laboratory scientist)

"Most of the different brands of reagents were not validated but had to be used because they were supplied by foreign donors to the government. I used six to eight different types of kits" (Laboratory scientist)

Remuneration and incentives

Remuneration and incentives were major challenges in the management of COVID-19. Many healthcare workers felt inadequately compensated for the increased risks and workload they faced during the pandemic. The lack of financial incentives led to decreased morale and motivation among doctors, nurses, and laboratory scientists. Some healthcare workers expressed frustration over the absence of hazard pay and bonuses, which they felt were necessary given the heightened dangers. This lack of adequate remuneration and incentives further exacerbated the stress and burnout experienced by healthcare workers.

"The major challenge that pains me up till today is the issue of compensation. We were not given anything at all. The management kept promising us, but nothing was given to us. Even when I got COVID-19, I bought drugs with my money." (Laboratory scientist)

"We worked with the whole of our heart but the renumeration was very poor. As far as I am concerned, there was no remuneration given to those of us who did not go for national assignment. There was no insurance for those that worked during the COVID-19 pandemic. Some healthcare workers died, and nothing was given to their families." (Nurse)

"I slept in my department for like two weeks, because I could not go home, buying food with my money. Until I was given an apartment in quarters. I did not go home for six months but talked with my wife and children on the phone. Yet there was no compensation from the government, hospital management, etc. I almost died looking like someone suffering from protein energy malnutrition. As far as I am concerned, there was no renumeration given to those of us that did not go for national assignment". (Doctor)

The COVID-19 pandemic posed significant challenges to healthcare workers in Nigeria, including staff shortages, high workload, inadequate training, inconsistent availability of reagents and PPE, risk of nosocomial infections, and stigmatization. Addressing these issues is crucial to better prepare for future pandemics and ensure the well-being of healthcare workers who are vital in managing such health crises.

DISCUSSION

The focus group discussions (FGD) conducted, provide valuable insights into the experiences and challenges faced by healthcare workers in managing COVID-19 patients. The main challenges faced by these healthcare workers were in the areas of nosocomial infection, stigmatization, staff

strength and high workload, use of personal protective equipment (PPE), training and treatment guidelines, and laboratory reagents. Nosocomial infection emerged as a significant concern among healthcare workers. The fear of contracting COVID-19 at the workplace was pervasive, exacerbated by real cases of staff infections. Participant testimonies highlighted the anxiety and mental strain caused by this risk. For instance, one participant noted spending the first month in fear after diagnosing the first COVID-19 case in the laboratory, only to contract the virus later. This finding aligns with other studies conducted in Kwara state Nigeria (Yahemba *et al.,* 2023), the Ashanti Region of Ghana (Ofori *et al.,* 2021), Porto, Portugal (Coelho *et al.,* 2020) which have shown that healthcare workers are at high risk for nosocomial infection during pandemics due to their close contact with infected patients and potential lapses in infection control practices.(Du *et al.,* 2021)·(Abbas *et al.,* 2021) Contrarily, some staff such as those who carry out administrative duties, security, and canteen staff who contracted the virus did not Work directly in isolation centres, indicating that infection Prevention control measures might have been more robust in those specific areas. This discrepancy underscores the need for consistent and rigorous infection prevention protocols across all hospital departments. Another notable challenge faced by the healthcare workers was Stigmatization, with patients reporting various forms of discrimination from colleagues, the public, and even family members. The fear of infection drove people to treat healthcare workers with suspicion and avoidance leading to social ostracism. This social ostracism contributed to the psychological burden on healthcare workers, as they were not only battling the physical toll of the pandemic but also facing social isolation and prejudice. Stigmatization is not unique to Edo State. Similar patterns have been observed in Nsukka Nigeria (Anyanwu *et al.,* 2020), Prague, Czechia (Janoušková *et al.,* 2024), Dhaka city of Bangladesh (Razu *et al.,* 2021), where healthcare workers have faced social stigma and discrimination due to their perceived exposure to COVID-19.(Jain *et al.,* 2021; Janoušková *et al.,* 2024) Addressing this issue requires public education campaigns to reduce fear and misinformation, as well as support systems for healthcare workers to mitigate the psychological impact of stigma. The pandemic exacerbated existing shortages of medical personnel, a situation described by patients as "Japa syndrome," where many healthcare workers left the country for better opportunities. This led to increased workloads for those remaining, with staff working extended hours and taking on additional responsibilities. The issue of inadequate staffing and high workload is a common challenge in low-

resource settings and has been highlighted in other studies as a critical factor affecting the quality of healthcare delivery during the pandemic. (Setiawan *et al.,* 2021) Solutions may include policy interventions to retain healthcare workers, enhance recruitment, and provide adequate compensation and support to reduce burnout. Challenges related to PPE were significant, with inconsistencies in availability and quality being major issues. While some patients reported shortages and the need to reuse PPE, others indicated that PPE was adequately supplied but still caused physical discomfort and fatigue. These challenges were compounded by the need for proper training and adherence to PPE protocols, which added to the workload and stress. The global shortage of PPE during the early stages of the pandemic was widely reported, affecting healthcare systems worldwide.(Razu *et al.,* 2021; Setiawan *et al.,* 2021) Ensuring a stable supply chain and providing training on proper PPE usage are crucial to protect healthcare workers and maintain their morale. Inadequate and inconsistent training on COVID-19 protocols and treatment methods was a major concern (Setiawan *et al.,* 2021). Many healthcare workers had to learn on the job, increasing their risk of contracting infection. Patients noted that while they had prior training in infection prevention and control (IPC), the specific demands of managing COVID-19 required additional, focused training that was often lacking. The need for comprehensive training programmes for healthcare workers during pandemics cannot be overstated. Effective training not only reduces the risk of nosocomial infections but also improves the quality of care provided to patients Training should be continuous and adaptive, reflecting the evolving nature of the pandemic and incorporating the latest evidence-based practices. Frequent stock outs and inconsistent supplies of laboratory reagents also posed significant challenges during the pandemic, delaying diagnosis and treatment. Patients reported having to use reagents close to their expiration dates or those not properly validated, which slowed down testing processes and reduced efficiency. This issue highlights the critical need for robust supply chain management and a reliable inventory of laboratory reagents and other essential supplies. The disruption in supply chains during the pandemic affected many countries, emphasizing the need for global cooperation and planning to ensure that essential medical supplies are available where they are most needed.

LIMITATION

While this study provides valuable insights into the challenges faced by Nigerian healthcare workers during the COVID-19 pandemic, it is not without limitations. First, the study's qualitative

design limits the generalizability of its findings to broader populations or healthcare contexts. The experiences and perspectives shared by participants may not fully capture the diversity of challenges encountered across different regions or healthcare settings within Nigeria. Second, the study relied on self-reported data, which may be subject to recall or social desirability bias, as participants might have underreported or exaggerated their experiences. Additionally, the rapidly evolving nature of the pandemic may mean that the challenges identified reflect only a specific period of the crisis, potentially overlooking issues that arose in subsequent phases.Third, logistical and resource constraints influenced the sampling and data collection process. Interviews were conducted remotely, which may have affected the depth of interaction and the ability to observe nonverbal cues that could enhance understanding of participants' experiences. Lastly, while efforts were made to ensure confidentiality, some healthcare workers may have been hesitant to fully disclose sensitive experiences, especially those related to systemic shortcomings, out of fear of repercussions. Despite these limitations, this study offers a rich, context-specific understanding of the struggles faced by healthcare workers and provides a foundation for future research aimed at addressing these challenges more comprehensively.

CONCLUSION

The COVID-19 pandemic presented unprecedented challenges for healthcare workers in Nigeria, as they navigated complex professional and personal landscapes during the crisis. This study highlighted the multifaceted difficulties they faced, including limited resources, heightened psychological stress, stigmatization, and the constant threat of infection. Despite these adversities, healthcare workers demonstrated remarkable resilience, adaptability, and commitment to their duty of care. The findings underscore the urgent need for systemic reforms to strengthen Nigeria's healthcare infrastructure and better support its workforce in future public health emergencies. Providing adequate personal protective equipment (PPE), improving training and mental health support, and fostering a culture of appreciation and recognition for healthcare workers are essential steps toward building a more robust and resilient health system. Ultimately, the insights gained from this exploration emphasize the importance of prioritizing the well-being of healthcare workers as a critical component of global health security, ensuring they remain equipped to weather future storms with greater preparedness and confidence.

Ethical clearance

Approval for this study was sought and obtained from the Ethical and Research Committee of ISTH (ISTH/HREC/20231806/447) and UBTH informed written consent obtained from the participants before the commencement of study and recruitment of healthcare workers respectively.

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Recommendations

1. **Recommendations to Healthcare System Administrators** Healthcare systems must be strengthened to handle pandemics more effectively. This includes improving the supply chain for personal protective equipment (PPE) and laboratory reagents to ensure consistent availability and quality. Training programs for healthcare workers should be enhanced, focusing on infection prevention and control, proper use of PPE, and updated COVID-19 management protocols. Standardized treatment guidelines need to be developed and disseminated to ensure consistent and effective patient care. Strengthening Healthcare Infrastructure: Increasing the recruitment and retention of healthcare personnel to address staff shortages and reduce workloads, potentially through improved remuneration and incentives. Enhancing the capacity of healthcare facilities to manage infectious diseases, including expanding intensive care units (ICUs) and isolation centres.
2. **Recommendations to Policy Makers** Addressing the issue of healthcare worker shortages is imperative. Strategies to retain healthcare professionals, such as offering competitive remuneration, professional development opportunities, and better working conditions, should be implemented. Policymakers should also focus on reducing the stigma associated with COVID-19, both within healthcare settings and the broader community, through public awareness campaigns.
3. **Recommendations to Healthcare Institutions** Mental health support services for healthcare workers should be established, providing counselling and stress management resources to help them cope with the psychological impact of the pandemic. Enhancing data management systems is crucial for efficiently tracking patient outcomes and resource

allocation. Investment in digital health infrastructure will facilitate real-time data analysis and improve decision-making during health crises.

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ABOUT THE INSTITUTE: The Institute of Viral and Emergent Pathogens Control and Research is one of the specialized centers at ISTH responsible for the management of viral hemorrhagic diseases, particularly COVID-19, Lassa fever, monkeypox, and yellow fever. Meanwhile, UBTH had established an isolation ward dedicated to the treatment of COVID-19 patients. Both hospitals are equipped with advanced laboratories, including molecular diagnostic and virology facilities, for the accurate diagnosis of COVID-19 using Polymerase Chain Reaction (PCR) technology.